

## SPECIAL SECTION

# Metabolism

### INTRODUCTION

- 1337 Metabolism Is Not Boring

### PERSPECTIVE

- 1338 On Getting There from Here  
S. L. McKnight

### REVIEWS

- 1340 The Control of the Metabolic Switch in Cancers by Oncogenes and Tumor Suppressor Genes  
A. J. Levine and A. M. Puzio-Kuter

- 1344 Autophagy and Metabolism  
J. D. Rabinowitz and E. White
- 1349 Circadian Integration of Metabolism and Energetics  
J. Bass and J. S. Takahashi
- 1355 Manufacturing Molecules Through Metabolic Engineering  
J. D. Keasling

>> Science Translational Medicine p. 1281 and Science Signaling at [www.sciencemag.org/special/metabolism/](http://www.sciencemag.org/special/metabolism/)



page 1306

### EDITORIAL

- 1287 Policy-Making Needs Science  
Bruce Alberts

### NEWS OF THE WEEK

- 1298 A Powerful and Perplexing New HIV Prevention Tool
- 1301 New HIV Infections Drop, But Treatment Demands Rise
- 1302 What Poison? Bacterium Uses Arsenic to Build DNA and Other Molecules  
>> Science Express Research Article by F. Wolfe-Simon et al.
- 1303 From Science's Online Daily News Site
- 1304 Panel Explores New Funding Pact With Washington
- 1305 With Money Tight, White House Panel Offers New Path to Energy Research
- 1305 From the Science Policy Blog

### NEWS FOCUS

- 1306 SCIENCE IN BRAZIL  
Brazilian Science: Riding a Gusher  
Tapping a Deep, 'Pre-Salt' Bounty  
Talented But Underfunded:  
Brazil's Future Scientists  
>> Science Podcast

### LETTERS

- 1316 Fishing for Data in the Ross Sea  
L. K. Blight et al.
- Assisted Colonization:  
Move Ahead with Models  
M. R. Stanley Price
- Assisted Colonization:  
Facilitate Migration First  
J. B. Ruhl
- Assisted Colonization:  
Protect Managed Forests  
J. F. Fernández-Manjarrés and L. Tschanz
- 1318 CORRECTIONS AND CLARIFICATIONS

### BOOKS ET AL.

- 1320 Brain Storm  
R. M. Jordan-Young;  
Delusions of Gender  
C. Fine, reviewed by D. F. Halpern
- 1322 Photograph 51  
A. Ziegler, reviewed by B. Juncosa

### POLICY FORUM

- 1324 Developing Health Workforce Capacity in Africa  
F. S. Collins et al.

### PERSPECTIVES

- 1326 Cryptic Links in the Ocean  
A. Teske  
>> Report p. 1375
- 1327 The DNA Damage Road Map  
N. Friedman and M. Schuldiner  
>> Report p. 1385
- 1328 Dynamic Metabolons  
B. L. Møller
- 1330 Opening the Cellular Poison Cabinet  
S. J. Martin  
>> Report p. 1390
- 1331 Dedicated to Memory?  
H. Eichenbaum  
>> Report p. 1408
- 1332 High-Temperature Rubber Made from Carbon Nanotubes  
Y. Gogotsi  
>> Report p. 1364

### GE PRIZE ESSAY

- 1334 A New Approach to Fluorescence Microscopy  
M. Bates

CONTENTS continued >>



### COVER

Autophagy, the process by which cells digest their own components, takes place in vesicles called autophagosomes (white membrane structures), the size of which are determined by the amount of a protein called Atg8. Basal amounts of Atg8 (small membrane-associated spheres) generate a small vesicle (middle left), whereas larger amounts cause formation of a full-fledged autophagosome (upper right). Autophagy provides fuel for cellular metabolism, the topic of the special section beginning on page 1337.

Painting: David S. Goodsell; Scientific Design: Zhou Du and Daniel J. Klionsky

### DEPARTMENTS

- 1283 This Week in Science
- 1289 Editors' Choice
- 1292 Science Staff
- 1297 Random Samples
- 1419 New Products
- 1420 Science Careers



# RESEARCH ARTICLE

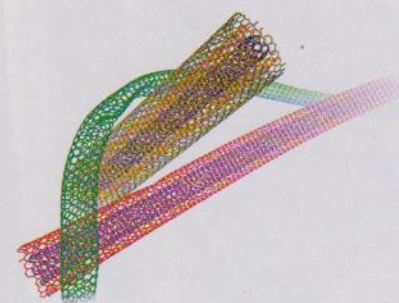
- 1359 **How Learning to Read Changes the Cortical Networks for Vision and Language**  
S. Dehaene et al.  
Reading changes the mind.

# REPORTS

- 1364 **Carbon Nanotubes with Temperature-Invariant Viscoelasticity from -196° to 1000°C**  
M. Xu et al.  
A dense carbon-nanotube network shows nearly constant viscoelastic properties over an exceptionally wide temperature range.  
>> *Perspective p. 1332*
- 1368 **Video-Rate Molecular Imaging in Vivo with Stimulated Raman Scattering**  
B. G. Saar et al.  
Raman spectra can be acquired rapidly from samples that otherwise would scatter the usable signal.  
>> *Science Podcast*
- 1371 **The Role of Particle Morphology in Interfacial Energy Transfer in CdSe/CdS Heterostructure Nanocrystals**  
N. J. Borys et al.  
Single-particle spectroscopy suggests that non-uniform geometries favor efficient charge separation for light harvesting.
- 1375 **A Cryptic Sulfur Cycle in Oxygen-Minimum-Zone Waters off the Chilean Coast**  
D. E. Canfield et al.  
Bacterial sulfur reduction and oxidation accompanies nitrogen cycling where oxygen levels at depth are low.  
>> *Perspective p. 1326*
- 1378 **Dynamical Response of the Tropical Pacific Ocean to Solar Forcing During the Early Holocene**  
T. M. Marchitto et al.  
Enhanced solar activity caused the tropical Pacific to cool into a La Niña-like state during the mid-Holocene.
- 1381 **Plasticity of Animal Genome Architecture Unmasked by Rapid Evolution of a Pelagic Tunicate**  
F. Denoeud et al.  
A metazoan genome departs from the organization that appears rigidly established in other animal phyla.
- 1385 **Rewiring of Genetic Networks in Response to DNA Damage**  
S. Bandyopadhyay et al.  
A network comparison of genetic interactions mapped at two conditions reveals genetic responses to DNA damage in yeast.  
>> *Perspective p. 1327*

- 1390 **BID, BIM, and PUMA Are Essential for Activation of the BAX- and BAK-Dependent Cell Death Program**  
D. Ren et al.  
Proapoptotic proteins act directly on mitochondrial "gatekeeper" proteins to initiate apoptotic events during mouse development.  
>> *Perspective p. 1330*
- 1393 ***Arabidopsis* Type I Metacaspases Control Cell Death**  
N. S. Coll et al.  
An ancient link between cell death control and innate immune receptor function has been discovered in plants.
- 1397 **An Antagonistic Pair of *FT* Homologs Mediates the Control of Flowering Time in Sugar Beet**  
P. A. Pin et al.  
A homolog of a *flowering time* gene has evolved a flowering repression function, affecting the seasonal cold response in beets.
- 1400 **Alleviating Neuropathic Pain Hypersensitivity by Inhibiting PKM $\zeta$  in the Anterior Cingulate Cortex**  
X.-Y. Li et al.  
Nerve injury increases the activity of an enzyme in the brain and contributes to chronic pain-related cortical sensitization.
- 1404 **Micro-Optical Sectioning Tomography to Obtain a High-Resolution Atlas of the Mouse Brain**  
A. Li et al.  
Acquisition of light microscopic data at 1-micrometer resolution for an entire mouse brain has been developed.
- 1408 **Paradoxical False Memory for Objects After Brain Damage**  
S. M. McTighe et al.  
Impaired recognition may be due to treating novel objects as familiar, rather than treating familiar objects as novel.  
>> *Perspective p. 1331*
- 1410 **Frequent Mutation of *BAP1* in Metastasizing Uveal Melanomas**  
J. W. Harbour et al.  
A gene implicated in the control of protein degradation is mutated at high frequency in a metastatic eye cancer.
- 1413 **Direct Exchange of Electrons Within Aggregates of an Evolved Syntrophic Coculture of Anaerobic Bacteria**  
Z. M. Summers et al.  
Direct cell-to-cell electron transfer occurs between two related species of bacteria.

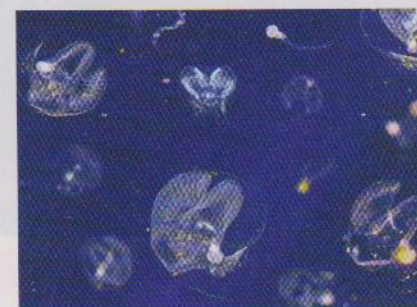
CONTENTS continued >>



pages 1332 & 1364



pages 1326 & 1375



page 1381